VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE ABSTRACT OF THE DISCLOSURE

The Abstract of the Disclosure has been amended as follows:

-- A noise component is removed from an angle signal obtained by performing polar conversion with respect to a position signal. [An angle] Angle data PI in the range of [from] 0 to 360° obtained by performing polar conversion with respect to a periodic signal is input to a low pass filter 7. The low pass filter 7 [comprises] has: a VCO 36 for outputting [a] smoothed angle data PF; a phase comparator 31 for obtaining a phase error PE between the angle data PI and the smoothed angle data PF; a first amplifier 32 for amplifying the phase error PE; a second amplifier 33 for further amplifying the phase error PE amplified by the first amplifier 32; an integrator 34 for integrating the phase error PE amplified by the second amplifier 33 to [thereby] obtain a velocity error VEL; and an adder 35 for adding the phase error PE amplified by the first amplifier 32 and the velocity error VEL to [thereby] determine a control voltage VS. The VCO 36 controls the frequency of the smoothed angle data PF so that the phase error is zero based on the control voltage FS, to [thereby] remove a high frequency component in the input angle data PI.--

IN THE CLAIMS

Claims 1-17 have been amended as follows:

--1. (Amended) A position detection apparatus comprising:

a recording medium on which a position signal [comprising] having a periodic signal is recorded;

a detection section [comprising] having a first detection head which moves relative to said recording medium along [the] a recording direction of said position signal for detecting said position signal, and a second detection head [which is] disposed apart from said first detection head by a predetermined distance [in the] along said recording direction of said position signal[, and] which moves relative to said recording medium, operating [together] with said first detection head for detecting said position signal;

a polar conversion section for converting [the] said position signal detected by said first detection head and said second detection head into an angle signal [showing] representing a relative position of said recording medium and said detection section in one period as an angle;

a low pass filter for removing a high pass component in [the] said angle signal output from said polar conversion section; and

an output section for outputting relative position information of said recording medium and said detection section, based on said angle signal [in] from which [the] said

high pass component has been removed by said low pass filter.

--2. (Amended) [A] The position detection apparatus according to claim 1, wherein said low pass filter [has] comprises:

a frequency control oscillator for outputting a periodic signal [in which the] having a frequency [is] controlled based on a frequency control signal;

a phase comparator for comparing [the] a phase of [the] said angle signal output from said polar conversion section and [the] said periodic signal output from said frequency control oscillator to [thereby] output a phase error;

an integrator for integrating [the] said phase error output from said phase comparator to [thereby] output a velocity error; and

an adder for adding [the] said velocity error output from said integrator and [the] said phase error output from said phase comparator to [thereby] generate said frequency control signal,

wherein said frequency control oscillator controls [the] said frequency of said periodic signal [so] such that said phase error is zero based on said frequency control signal, and outputs [the] said periodic signal as [the] said angle signal [in] from which [the] said high pass component has been removed.

--3. (Amended) [A] The position detection apparatus

according to claim 2, wherein said low pass filter [has] comprises:

first increase and decrease means for increasing or decreasing [the] said phase error output from said phase comparator; and

[a] second increase and decrease means for increasing or decreasing [the] said phase error output from said first increase and decrease means[;],

wherein said integrator integrates [the] said phase error increased or decreased by [the] said second increase and decrease means; and

said adder adds [the] said velocity error output from said integrator and [the] said phase error output from said increase and decrease means.

--4. (Amended) [A] The position detection apparatus according to claim 2, further comprising a prediction section having an adder which adds [the] said velocity error output from [an] said integrator in said low pass filter and said angle signal output from said frequency control oscillator,

wherein said output section outputs said relative position information of said recording medium and said detection section, based on [the] a signal output from said prediction section.

--5. (Amended) [A] The position detection apparatus according to claim 4, wherein said prediction section has

third increase and decrease means for increasing or decreasing [the] said velocity error output from [the] said integrator in said low pass filter[;],

wherein said adder adds said angle signal output from said frequency control oscillator and [the] a velocity error output from said third increase and decrease means.

--6. (Amended) [A] The position detection apparatus according to claim 2, wherein said frequency control oscillator in said low pass filter designates an initial output value as an angle signal to be [input] output from said polar conversion section to said phase comparator.

--7. (Amended) [A] The position detection apparatus according to claim 2, wherein said polar conversion section generates an amplitude signal together with [the] said angle signal, and comprises[:]

a noise detection section for detecting internal noise based on said amplitude signal and/or said phase error.

--8. (Amended) [A] The position detection apparatus according to claim 2, further comprising[:]

a gain control section for controlling a gain of [the] said phase error output from said phase comparator.

--9. (Amended) [A] The position detection apparatus according to claim 8, wherein said gain control section

controls [the] said gain of [the] said phase error output from said phase comparator, depending on [the] a size of [the] said phase error and/or [the] a frequency of [the] said phase error.

--10. (Amended) [A] The position detection apparatus according to claim 8, wherein said polar conversion section generates an amplitude signal together with [the] said angle signal, and comprises:

a noise detection section for detecting inside noise based on said amplitude signal and/or said phase error,

wherein said gain control section decreases [the] said gain of [the] said phase error output from said phase comparator, when external noise occurs, or said noise detection section detects noise.

--11. (Amended) [A] The position detection apparatus according to claim 10, wherein said gain control section temporarily decreases said gain.

--12. (Amended) [A] The position detection apparatus according to claim 8, wherein said gain control section decreases [the] said gain of said phase error, when an absolute value of [the] said phase error output from said phase comparator increases, exceeding a [certain] predetermined level.

--13. (Amended) [A] The position detection apparatus according to claim 12, wherein said gain control section decreases [the] said gain of said phase error, when [a] said condition that [the] said absolute value of [the] said phase error output from said phase comparator increases, exceeding [a certain] said predetermined level[, continues] for a predetermined time.

--14. (Amended) [A] The position detection apparatus according to claim 1, wherein said polar conversion section designates [a] said position signal detected by [the] said first detection head and [the] said second detection head as an address, and uses a table wherein said angle signal corresponding to [the] said address is stored, to [thereby] generate [an] said angle signal [showing a] representing said relative position of said recording medium and said detection section in one period as [an] said angle.

--15. (Amended) [A] The position detection apparatus according to claim 14, wherein said address and/or said angle signal are Gray coded.

--16. (Amended) An arithmetic processing unit comprising:

a polar conversion section for [respectively] converting a first periodic signal and a second periodic signal whose phase is different from that of said first periodic signal

into an angle signal showing an angle in one period of said first periodic signal and said second periodic signal;

a low pass filter for removing a high pass component in said angle signal output from said polar conversion section; and

an output section for outputting position information shown by said first periodic signal and said second periodic signal, based on said angle signal [wherein the] from which said high pass component has been removed by said low pass filter.

--17. (Amended) [An] The arithmetic processing unit according to claim 16, wherein said low pass filter [has] comprises:

a frequency control oscillator for outputting a periodic signal [in which the] having a frequency [is] controlled based on a frequency control signal;

a phase comparator for comparing [the] a phase of [the] said angle signal output from said polar conversion section and [the] said periodic signal output from said frequency control oscillator to [thereby] output a phase error;

an integrator for integrating [the] said phase error output from said phase comparator to [thereby] output a velocity error; and

an adder for adding [the] said velocity error output from said integrator and [the] said phase error output from said phase comparator to [thereby] generate said frequency control

signal,

wherein said frequency control oscillator controls [the] said frequency of said periodic signal [so] such that said phase error is zero based on said frequency control signal, and outputs [the] said periodic signal as [the] said angle signal [in] from which [the] said high pass component has been removed.--